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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,456	10/31/2003	David Champion	100200584-1	9588

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FORT COLLINS, CO 80527-2400

EXAMINER

ONEILL, KARIE AMBER

ART UNIT	PAPER NUMBER
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1745

MAIL DATE	DELIVERY MODE
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07/13/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/699,456

Applicant(s)

CHAMPION ET AL.

Examiner

Karle O'Neill

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2007.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20, 48, 49 and 68-71 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20, 48, 49 and 68-71 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☒ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. The Applicant's amendment filed on May 4, 2007, was received. None of the claims were amended. Claims 21-47 and 50-67 have been cancelled. Therefore, Claims 1-20, 48, 49 and 68-71 are pending in this office action.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on February 6, 2007.

Claim Rejections - 35 USC § 102

3. The claim rejections under U.S.C. 102(b) with regard to Claims 1-10, 15-17, 20, 48-49, 68-69 and 71 as being anticipated by Li et al. (US 2002/0142202 A1) have been withdrawn because Applicant's arguments were persuasive.

4. The Claim rejections under 35 U.S.C. 102(e) as being anticipated by Mardilovich et al. (US 6,770,353 B1) on Claims 1-6, 9-10, 12-13, 15, 49, and 68-71 are maintained. The rejection is repeated below for convenience.

With regard to Claims 1-3, 49, and 71, Mardilovich et al. disclose a thin film solid oxide fuel cell (Figure 11), comprising: a substrate of electrolyte material; and a patterned film established on the substrate (Figure 5A), the patterned film having a plurality of nanocolumns (16) dispersed in filler (20) which form the patterned film (18); wherein the plurality of nanocolumns enhances catalytic activity and conductivity of the patterned film,

and wherein the plurality of nanocolumns increases the number of sites per unit volumes where catalysis takes place (column 7 lines 29-47).

With regard to Claim 4, Mardilovich et al. disclose wherein the electrolyte is at least one of yttria-stabilized zirconia (column 7 line 33).

With regard to Claim 5, Mardilovich et al. disclose wherein the substrate is at least one of a ceramic, which is formed of the electrolyte material of yttria-stabilized zirconia (column 7 line 33).

With regard to Claim 6, Mardilovich et al. disclose wherein the plurality of nanocolumns is formed from at least one of electrolyte filament materials, which is yttria-stabilized zirconia (YSZ) (column 3 line 37).

With regard to Claims 9-10 and 12-13, Mardilovich et al. disclose in Figure 11, wherein the patterned film comprises anode (58) and cathode (60) films (column 7 lines 29-33), which are formed of materials including metallic components of anode and cathode material (column 3 lines 34-37).

With regard to Claim 15, Mardilovich et al. disclose fragment nano-columns embedded in filler, which may be controlled by patterning a seed layer of nucleation sites. He also discloses that without the use of patterned seed layers to define nucleation sites, the location of the nano-columnar structures is influenced by whether the initial films do not wet the substrate surface, in which case a self-assembly or random process defines the locations (column 5 lines 19-26).

With regard to Claim 68, Mardilovich et al. disclose that the thin films produced are useful in fuel cells. It is the position of the examiner that the fuel cells of Mardilovich et al.

Art Unit: 1745

and the instant application have the same structural features and the thin films can be used in the same type of fuel cells. Applicant is advised to submit other information in regard to a single chamber fuel cell if it is shown to be patentably distinct to the invention.

With regard to Claim 69, Mardilovich et al. disclose in Figure 11, the plurality of nanocolumns are connected to at least one of electrolyte grains which are part of the electrolyte material which makes up the substrate upon which the anode and cathode patterned films are deposited (column 7 lines 29-33).

With regard to Claim 70, Mardilovich et al. disclose in Figure 11, wherein the plurality of nanocolumns are formed from electrolyte filament material or YSZ (column 3 line 37), and wherein the fuel cell further comprises cathode material nanocolumns, made of YSZ, dispersed and connected to the electrolyte filament material nanocolumns, which are both made of the same material and would inherently be dispersed with one another.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 7, 8, 11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mardilovich et al. (US 6,770,353 B1), as applied to Claims 1-6, 9-10, 12-13, 15, 49 and 68-71 above, and in further view of Jeon et al. (US 2004/0197626).

Mardilovich et al. disclose the fuel cell in paragraph 4 above, but do not disclose wherein the current collector material comprises high temperature metals, such as gold, copper, stainless steel, nickel alloys and mixtures thereof, and anode metallic components comprise at least one of nickel-copper alloys, platinum, palladium, ruthenium, alloys thereof and mixtures thereof, and wherein the cathode metallic components comprise at least one of rhodium, platinum, silver, alloys thereof and mixtures thereof.

Jeon et al. disclose a solid oxide fuel cell in which the anode and cathode materials are made of a thin film of a suitable catalyst material such as nickel, platinum or platinum alloy nanoparticles and conducting current-collectors are made of graphite or stainless steel (paragraph 0019). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use metallic anode and cathode components and stainless steel current collectors in the fuel cell of Mardilovich et al. because Jeon et al. teach that these components are good conductive materials (paragraph 0019).

7. Claims 16-20 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mardilovich et al. (US 6,770,353 B1), as applied to Claims 1-6, 9-10, 12-13, 15, 49 and 68-71 above.

Mardilovich et al. disclose the fuel cell in paragraph 4 above, but do not disclose the diameter and/or the length of the nanowires and do not disclose wherein the fuel cell is connected to an electrical load. However, Mardilovich et al. recognize that the relative deposition rates will influence the technique for changing the angle of the nanocolumns (column 4 lines 20-31). Therefore, it would have been within the skill of the ordinary

Art Unit: 1745

artisan to increase or decrease the diameter of the nanocolumns to a range between about 1nm and about 100nm, more preferably between about 10nm and about 50nm, and the length of the nanocolumns to a range between about 15nm to about 2000nm, more preferably between about 100nm and about 500nm in order to control the formation of the continuous film with nanocolumns (column 4 lines 34-36). *Discovery of an optimum value of a result effective variable in known processes is ordinarily within the skill of the art. In re Boesch*, CCPA 1980, 617 F.2d 272, 205 USPQ 215. It would also have been obvious to one of ordinary skill in the art at the time of the invention to connect the fuel cell of Mardilovich et al. (see Figure 11) to a load because the fuel cell generates electrical energy that is useful in any number of electrical devices comprising loads.

Response to Arguments

8. Applicant's arguments filed May 4, 2007, have been fully considered but they are not persuasive.

Applicant's principal arguments are:

- (a) Mardilovich et al. is not a proper 35 U.S.C. 102(e) reference.*
- (b) Mardilovich et al. do not teach the nano-columnar structures being dispersed through a medium, rather they are aligned on a substrate.*

In response to Applicant's arguments, please consider the following comments:

- (a) The Mardilovich et al. has the same assignee as the instant application, however, the not all of the inventors are the same in both applications, therefore the

Mardilovich et al. reference is a proper 35 U.S.C. 102(e) reference because it is "by another".

(b) Deposition conditions are controlled to form the continuous thin film with nano-columns and filler, which are then deposited onto a substrate. The nano-columns and filler are dispersed with one another. See Figures 5B, 6A and 6B. It can be seen that the nano-columns (16) are dispersed through the filler material (20).

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 1745

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571) 272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Karie O'Neill
Examiner
Art Unit 1745

KAO


DAH-WEIYUAN
PRIMARY EXAMINER